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Isolation and properties of gamma-tocopherol methyltransferase in *Euglena gracilis*.

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Gamma-Tocopherol methyltransferase (EC2.1.1.-), which catalyzes the conversion of gamma-tocopherol into alpha-tocopherol, was present in a cell homogenate of *Euglena gracilis*. The enzyme was loosely bonded to the outer membrane of chloroplasts and solubilized from chloroplast membranes by a detergent, followed by partial purification in a three-step procedure. The methyltransferase showed a pH optimum of 7.5 and a temperature optimum of 35 degrees C and had an M(r) of 150,000. The activity was about 1.4-fold higher with gamma-tocopherol than with beta-tocopherol as substrate. The enzyme was specific for S-adenosylmethionine as a methyl donor, with a K_m value of 50 microM. The addition of homogentisate, L-tyrosine and L-phenylalanine into a suspension of *Euglena* cells increased the relative pool sizes of alpha- and gamma-tocopherol, but not those of beta- and delta-tocopherol. The contents of alpha- and gamma-tocopherol in a chloroplast fraction of *Euglena* were always higher than those of any other fraction after any period of incubation with homogentisate. Based on the results of the present experiments, we propose a biosynthetic pathway of alpha-tocopherol in *Euglena gracilis*.

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